Appendix G

WATER AND SEWER STUDIES

WATER STUDY

WATER STUDY FOR THE WESTFIELD PLAZA CAMINO REAL EXPANSION PROJECT IN THE CITY OF CARLSBAD

June 25, 2008

Prepared by:
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Job No. 891-001

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June 25, 2008 891-001

Westfield, LLC
402 West Broadway, Suite 2050
San Diego, CA 92101

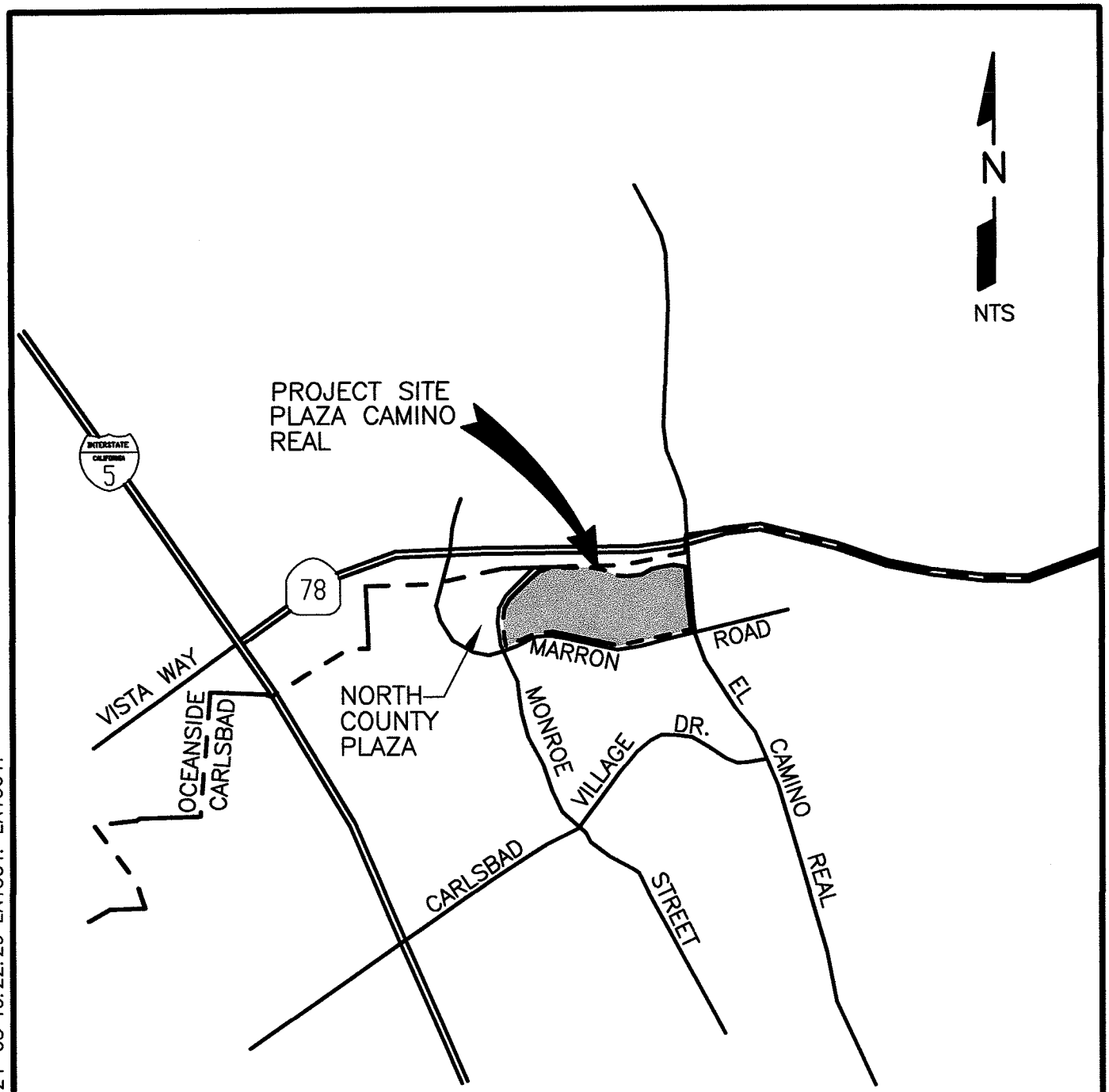
Attention: A. J. Taranton Jr., Director of Development

Subject: Water Study for the Westfield Plaza Camino Real Expansion Project in the City of Carlsbad

Introduction

The Westfield Plaza Camino Real project is located in the City of Carlsbad within the County of San Diego. The project is situated in the northern portion of the City along the City of Oceanside boundary. Specifically, the project is bound by Highway 78 to the north, Marron Road to the south, El Camino Real to the east, and the North County Plaza shopping area to the west. Figure 1 provides a location map for the project.

The Westfield Plaza Camino Real presently consists of 1,130,037 square feet of gross leasable area (ft^2 GLA). Expansion of the project site will include the demolition of 196,567 ft^2 GLA and construction or renovation of 342,500 ft^2 GLA for a total of 1,275,970 ft^2 GLA at project completion.



\\PACIFIC\DWG\891001\FIGURE-1.DWG 06-24-08 10:22:29 LAYOUT: LAYOUT1

FIGURE 1

LOCATION MAP

Water service to the project is provided by the Carlsbad Municipal Water District, a subsidiary district of the City of Carlsbad. The purpose of this letter report is to determine the water demands required by the proposed project expansion and assess the impact of these demands on the Carlsbad Municipal Water District's water supply and distribution system. Recycled water will be discussed as well.

Existing Water Supply and Distribution System

Water service to the Westfield Plaza Camino Real is from the Carlsbad Municipal Water District, a subsidiary district of the City of Carlsbad. All of the District's potable water is supplied from the San Diego County Water Authority's Second Aqueduct, which carries treated water. The treated water supplies four of the District's pressure zones and is moved through a series of reservoirs and pressure reducing stations to supply the 255 Pressure Zone, which directly serves the project. The following section will discuss the District's water supply and the distribution system surrounding the project.

Water Supply. The San Diego County Water Authority's December 2002 *Regional Water Facilities Master Plan*, projects the future demand required by the Authority and its member agencies through a comprehensive model which incorporates SANDAG's City/County demographic forecasts. The table found in Appendix A summarizes the demands forecasted by the model and used in the Authority's planning. Notably, for the years 2020, 2025, and 2030, the City of Carlsbad's projected annual demands are 28,900, 30,800, and 32,300 acre-feet, respectively. This includes municipal, industrial, and agricultural demands with conservation measures reducing the municipal and industrial demand by 12 percent over time.

Water Distribution System. The 255 Pressure Zone, which serves the northwest corner of the City and the majority of the City's coastal customers, is the lowest of the District's 17 pressure zones in terms of hydraulic grade line. In the vicinity of the project, the 255 Zone is primarily supplied by the Elm Reservoir to the south of the project along Carlsbad Village Drive, the 490 Zone to 255 Zone pressure reducing station (May Co., #73) to the southeast in El Camino Real, and the Buena Vista pressure reducing station (#7) to the southwest along Buena Vista Way. There is an emergency inter-tie with the City of Oceanside's 409 Pressure Zone at El Camino Real and Highway 78. With elevations onsite ranging from 10 feet to 54 feet, the maximum static pressures range from 87 psi to 106 psi.

Surrounding the existing buildings onsite is a 10-inch public water line loop. Service laterals and fire hydrants branch from this loop to serve the Plaza Camino Real tenants. The 10-inch loop connects to a 10-inch water line in El Camino Real to the east, a 12-inch water line to the south in Marron Road, and a 12-inch water line to the west between the Plaza Camino Real and North County Plaza properties. Figure 2 provides an overview of the existing public water system surrounding the project site.

Project Water Demands

Utilizing the building area square footage of the existing and proposed Plaza Camino Real project and the District's March 2003 *Water Master Plan Update*, the average day, maximum day, and peak hour demands were determined. Table 1 below summarizes these demands. Average day demands were determined based on the non-residential water use rate of 2,300 gallons per day per 10,000 square feet of building area. Maximum day and peak hour demands are the average day demands multiplied by the peaking factors of 1.65 and 2.9, respectively.

LEGEND

EXISTING WATER LINES

PRESSURE REDUCING STATION

78

N

APPROX. SCALE:
1" = 550'

PLAZA CAMINO REAL

MARRON ROAD

MONROE STREET

CARLSBAD VILLAGE DR.

EL CAMINO REAL

BUENA VISTA WAY

INTERSTATE CALIFORNIA 5

10" 12" 10" 10" 10" 10" 10" 10" 10" 8" 12" 12" 18" 12" 12" 12" 12" 14" 14" 12" 12" 14" 12"

490 TO 255 ZONE
PR STATION

330 TO 255 ZONE
PR STATION

ELM RESERVOIR
HWL = 277.5 FT.
LWL = 255 FT.

FIGURE 2
PLAZA CAMINO REAL EXISTING 255 ZONE WATER SYSTEM

\\PACIFIC\DWG\891001\WATER\FIGURE-2.DWG 06-24-08 08:25:38 LAYOUT: LAYOUT1

TABLE 1 PLAZA CAMINO REAL POTABLE WATER DEMANDS				
Project	**Building Area, sf**	**Average Day, gpm**	**Maximum Day, gpm**	**Peak Hour, gpm**
Existing	1,130,037	180.5	297.8	523.4
Proposed	1,275,970	203.8	336.3	591.0
Net Change	**+ 145,933**	**+ 23.3**	**+ 38.5**	**+ 67.6**

Fire Flow. The District's *Water Master Plan Update* identifies, for planning purposes, a fire flow requirement of 4,000 gpm for 4 hours for the Industrial/Commercial/Institutional land use type. The City of Carlsbad Fire Department will ultimately determine the fire flow requirement based on building size, construction type, and other fire protection features incorporated into the project design. For a conservative analysis, the project impacts discussed in the following sections are based on a fire flow requirement of 6,000 gpm.

Recycled Water

In August 1990, the District, City of Carlsbad, and San Diego County Water Authority developed the *City of Carlsbad Water Reclamation Master Plan.* The Master Plan recommended supplying recycled water to the identified markets and users over five planning phases. To date, the City has completed the construction of Phases I and II. The Plaza Camino Real and North County Plaza sites were collectively identified within the Master Plan to be served in Phase IV.

It is recommended that for irrigation piping installed as part of the project expansion, recycled water pipe or "purple pipe" be installed. While supplied by the potable water

system initially, installing the purple pipe now would eliminate the need to retrofit piping once recycled water is available in the site vicinity.

Impact of the Proposed Project

From the existing development onsite the Plaza Camino Real project, redevelopment plans will increase the project building area square footage by 145,933 square feet. The following section will discuss the impact of this expansion on the District's potable water supply and distribution system.

Water Supply. It is estimated that the increase in building square footage will increase the average day potable water demands for the site by 23.3 gpm to a total of 203.8 gpm. While this increase was not specifically identified in the District's *Water Master Plan Update* as part of the City's Growth Database, the Master Plan projected the District's ultimate, or buildout, average day demand to be 23.9 million gallons per day. In comparison, the San Diego County Water Authority has projected that Carlsbad will require upwards of 28.8 mgd through year 2030. As the supplier of the District's water whose planning projections exceed that of the District's, it can be comfortably said that supply will be available from the Authority to accommodate the 23.3 gpm (0.034 mgd) increase in average day demand.

In concert with this, the District has plans to expand their recycled water system which will reduce the per capita quantity of potable water required from the Authority as the District approaches ultimate buildout demands.

Water Distribution System. To evaluate the impacts of the project expansion on the existing water distribution system, a computer model was developed to simulate system flows and pressures. The computer software program KYPIPE utilizes the Hazen-Williams equation for determining headloss in pipes. The Hazen-Williams "C" value used for all pipe sizes in this analysis is 120. Minor fitting losses were modeled as equivalent lengths of pipe.

The water system was conservatively modeled with an estimated hydraulic grade line of 255 feet at the Elm Reservoir and pressure reducing station locations. As described previously, the existing water system consists of a 10-inch loop around the buildings with connections to the 10-inch line in El Camino Real, the 12-inch in Marron Road, and the 12-inch to the west of the site.

The hydraulic analyses included first evaluating existing average day, maximum day, and peak hour demands both onsite and offsite the project. A list of the offsite demands included in the analyses can be found in Appendix B. The onsite demands were then increased to the project buildout quantities and fire flow simulations were conducted to discern the maximum fire flow that can be supplied to the site while maintaining a minimum residual pressure of 20 psi. The series of hydraulic analyses conducted indicate that the existing system is able to supply maximum day demands plus a fire flow of 6,000 gpm with a minimum pressure of 49.4 psi. Appendix C provides the results of these analyses and corresponds with Exhibit A at the back of the report.

Based on these analyses, the existing system can accommodate the increase in demands from the project. Regarding fire flow demands specifically, the system can deliver not only the 4,000 gpm flow utilized for planning purposes, but up to 6,000 gpm.

Conclusions and Recommendations

The following recommendations and conclusions are made based on the water system analyses performed for the Plaza Camino Real project.

1. Based on the Carlsbad Municipal Water District's potable water demand factors, the increase in Plaza Camino Real's gross leasable area of 145,933 sf equates to a 23.3 gpm increase in average potable water demand for the site.

2. Based on the District's peaking factors of 1.65 for maximum day and 2.9 for peak hour, these demands from the project site at buildout will be 336.3 gpm and 591.0 gpm, respectively.

3. The project site was identified to receive recycled water in Phase IV of the City's master planning efforts. The District has presently completed Phases I and II. It is recommended that purple pipe be used for any new irrigation piping installed as part of the expansion project.

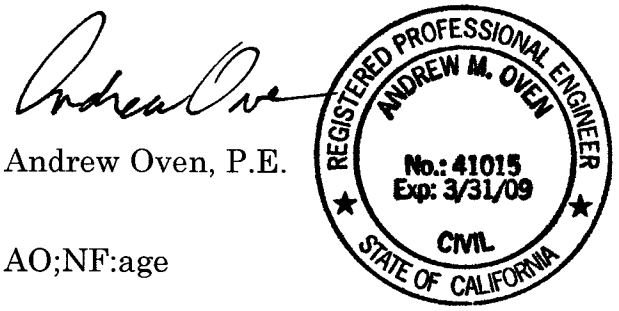
4. The San Diego County Water Authority, which supplies Carlsbad with potable water, has projected the District requiring 28.8 mgd by year 2030. The District's 2003 *Water Master Plan Update* projects the ultimate buildout demand from the District to be 23.9 mgd average. As the demand from the existing site would have been included in the 2003 *Water Master Plan Update*, the addition of 23.3 gpm or 0.034 mgd average can be accommodated by the Authority's supply.

5. The existing onsite water system layout consists of a 10-inch loop around the buildings and connections to the 10-inch water line in El Camino Real, the 12-inch in Marron Road, and the 12-inch line to the west of the project site. It is recommended that these three connections are maintained in the project expansion.

6. The existing system described above is capable of delivering maximum day demands and a 6,000 gpm fire flow with a minimum residual onsite pressure of 58.9 psi. As such, the existing system can accommodate the expansion project.

Thank you for the opportunity to assist you with the water system planning for the Plaza Camino Real project. If you have any questions regarding the information presented in this report, please do not hesitate to call.

Dexter Wilson Engineering, Inc.



Andrew Oven, P.E.

AO;NF:age

Attachments

APPENDIX A

INFORMATION FROM THE SAN DIEGO COUNTY WATER AUTHORITY'S *REGIONAL WATER FACILITIES MASTER PLAN*, DECEMBER 2002

Table 3-5. Probabilistic Forecasts of M&I and Municipally Supplied Agricultural Water Demands for Authority Member Agencies (2005-2030) (ac-ft/yr)[a]

	2005			2010			2015			2020			2025			2030		
	Percentile			Percentile			Percentile			Percentile			Percentile			Percentile		
Agency	5	50	95	5	50	95	5	50	95	5	50	95	5	50	95	5	50	95
Carlsbad	20,500	21,700	23,000	21,600	23,500	25,300	23,300	6,100	29,100	24,900	28,900	32,900	25,500	30,800	36,500	25,700	92,300	39,100
Del Mar	1,500	1,600	1,700	1,500	1,600	1,700	1,500	1,700	1,900	1,500	1,800	2,000	1,500	1,900	2,200	1,500	1,900	2,300
Escondido	27,300	31,000	35,100	27,500	31,300	35,300	27,000	1,200	35,300	26,400	30,900	35,600	26,500	32,500	39,000	26,100	33,600	41,100
Fallbrook	14,200	16,800	21,100	14,300	17,000	21,200	14,600	17,600	21,800	15,100	18,400	22,900	14,700	18,300	22,800	14,400	18,100	22,600
Helix	36,900	39,400	41,900	36,300	40,100	43,900	35,600	40,900	46,300	35,300	42,200	49,100	34,900	44,400	54,100	34,200	45,700	57,500
Oceanside	33,100	35,700	38,100	34,000	37,500	40,900	35,200	39,600	44,100	36,000	41,700	47,500	36,100	43,300	51,300	35,300	44,300	53,400
Olivenhain	18,300	19,600	20,900	18,800	20,800	22,900	19,700	22,600	25,700	19,700	23,600	27,700	19,300	24,400	30,000	18,600	24,800	31,300
Otay	32,300	34,300	36,400	35,100	38,300	41,500	39,000	43,800	48,700	42,700	49,500	56,400	44,100	53,300	63,300	44,500	56,200	68,000
Padre Dam	19,700	21,100	22,400	19,800	21,900	24,000	20,300	23,200	26,200	21,400	25,600	30,000	22,100	27,800	34,200	22,300	29,700	37,500
Poway	18,400	19,500	20,600	18,800	20,400	22,100	19,000	21,300	23,700	19,200	22,200	25,300	19,200	23,100	27,300	18,700	23,500	28,400
Rainbow	26,900	31,100	39,500	27,200	31,500	39,800	28,600	33,400	41,800	30,500	36,000	44,800	30,100	36,200	44,800	29,500	36,300	45,000
Ramona	8,600	10,600	12,700	9,500	11,600	13,700	9,800	11,700	13,800	9,900	11,900	14,000	10,200	13,000	16,000	10,400	14,000	18,000
Rincon	8,100	8,800	9,400	8,100	9,000	9,800	8,300	9,500	10,800	8,200	9,800	11,300	8,000	10,000	12,200	7,800	10,100	12,600
San Diego	247,900	262,300	277,200	250,500	272,500	296,100	255,800	288,500	321,800	260,800	304,900	349,800	263,300	323,400	386,900	261,900	336,100	411,700
San Dieguito	6,900	7,400	7,800	6,600	7,300	8,000	6,500	7,500	8,400	6,600	7,700	9,000	6,500	8,100	9,800	6,400	8,300	10,300
Santa Fe	11,700	12,600	13,400	11,300	12,600	13,800	11,400	13,100	14,900	11,400	13,700	16,100	11,200	14,200	17,500	10,600	14,400	18,200
Sweetwater	21,900	23,300	24,600	21,400	23,400	25,600	21,400	24,200	27,100	21,600	25,400	29,100	21,600	26,800	32,200	21,500	27,800	34,200
Vallecitos	15,900	17,000	18,200	16,800	18,300	19,900	18,200	20,400	22,900	19,700	23,100	26,600	20,500	25,300	30,500	20,900	27,300	33,700
Valley Center	41,300	48,600	63,300	40,300	47,100	60,800	39,200	45,800	58,700	37,400	43,600	54,100	37,300	44,500	55,400	37,300	45,700	56,200
Vista	23,900	25,300	26,800	24,500	26,700	29,000	25,300	28,500	31,900	26,000	30,500	34,800	26,200	32,100	38,300	25,900	33,000	40,300
Yuima	5,000	9,800	14,700	5,000	9,800	14,800	5,200	10,100	15,100	5,300	10,400	15,500	5,000	9,800	14,500	4,800	9,200	13,700
Authority	665,400	697,300	730,300	670,200	722,100	774,000	686,500	760,800	838,700	699,200	801,700	905,100	701,000	843,100	992,400	696,100	872,400	1,050,400

[a] Does not include 11,700 acre-feet of water demand for Camp Pendleton (a deterministic forecast).

APPENDIX B

MODELED OFFSITE WATER DEMANDS

TABLE C-1 MODELED OFFSITE WATER DEMANDS			
Computer Modeling Node	**Area Description**	**Source**	**Flow, gpm**
Single Family Unit (SFU) Demand = 550 gpd/EDU Multi Family Unit (MFU) Demand = 250 gpd/EDU			
2 & 4	Commercial area of sub-basin 2A	2003 Sewer Master Plan Non-Residential flow of 67.97 gpm which is based on assumed 90% return rate from water billing records	76 38 at each
4	½ Pressure Zone 285 Demand	2003 Water Master Plan	55
22	22 SFU + 24 MFU	Aerial image	13
24	50 SFU	Aerial image	19
26	50 SFU	Aerial image	19
28	Commercial area of sub-basin 1B	2003 Sewer Master Plan Non-Residential flow of 19.23 gpm which is based on assumed 90% return rate from water billing records	22
TOTAL			**204**

APPENDIX C

COMPUTER RUNS

NODE AND PIPE DIAGRAM REFERENCE:

Exhibit A at the back of the report.

CONDITIONS MODELED:

All Pipes Open

1. Existing average day demands.
2. Project buildout maximum day demands.
3. Project buildout maximum day demands plus 6,000 gpm fire flow onsite.

FINAL

FLOWRATE IS EXPRESSED IN GPM AND PRESSURE IN PSIG

A SUMMARY OF THE ORIGINAL DATA FOLLOWS

PIPE NO.	NODE NOS.		LENGTH (FEET)	DIAMETER (INCHES)	ROUGHNESS	MINOR LOSS K	FIXED GRADE
1	0	2	2000.0	10.0	120.0	.00	255.00
3	0	36	10.0	14.0	120.0	.00	255.00
5	0	34	10.0	14.0	120.0	.00	255.00
7	2	18	400.0	8.0	120.0	.00	
9	18	16	500.0	10.0	120.0	.00	
11	2	4	750.0	10.0	120.0	.00	
13	4	6	400.0	10.0	120.0	.00	
15	16	6	500.0	10.0	120.0	.00	
17	16	14	500.0	10.0	120.0	.00	
19	12	14	2700.0	10.0	120.0	.00	
21	10	12	1500.0	10.0	120.0	.00	
23	8	10	2000.0	10.0	120.0	.00	
25	6	8	800.0	10.0	120.0	.00	
29	30	10	800.0	12.0	120.0	.00	
31	28	30	600.0	10.0	120.0	.00	
33	28	26	5000.0	12.0	120.0	.00	
35	24	26	800.0	14.0	120.0	.00	
37	24	34	2000.0	12.0	120.0	.00	
39	34	22	2600.0	14.0	120.0	.00	
41	36	22	2000.0	14.0	120.0	.00	
43	22	32	4000.0	12.0	120.0	.00	
45	32	30	1700.0	12.0	120.0	.00	
47	36	20	2400.0	12.0	120.0	.00	
49	20	18	1400.0	12.0	120.0	.00	

JUNCTION NUMBER	DEMAND	ELEVATION	CONNECTING PIPES		
2	38.00	46.00	1	7	11
4	93.00	33.00	11	13	
6	.00	43.00	13	15	25
8	45.00	29.00	23	25	
10	45.00	20.00	21	23	29
12	45.00	35.00	19	21	
14	45.00	41.00	17	19	
16	.00	41.00	9	15	17
18	.00	53.00	7	9	49
20	.00	58.00	47	49	
22	13.00	139.00	39	41	43
24	19.00	89.00	35	37	
26	19.00	100.00	33	35	
28	22.00	10.00	31	33	
30	.00	15.00	29	31	45
32	.00	20.00	43	45	
34	.00	.00	5	37	39
36	.00	.00	3	41	47

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD
3 VALUES ARE OUTPUT FOR MAXIMUM AND MINIMUM PRESSURES
THIS SYSTEM HAS 24 PIPES WITH 18 JUNCTIONS , 4 LOOPS AND 3 FGNS

THE RESULTS ARE OBTAINED AFTER 8 TRIALS WITH AN ACCURACY = .00012

PLAZA CAMINO REAL
WATER SYSTEM ANALYSIS
EXISTING AVERAGE DAY DEMANDS

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	2	93.64	.18	.00	.00	.38	.09
3	0	36	153.99	.00	.00	.00	.32	.04
5	0	34	136.37	.00	.00	.00	.28	.03
7	2	18	-18.20	-.01	.00	.00	-.12	-.01
9	18	16	86.94	.04	.00	.00	.36	.08
11	2	4	73.84	.04	.00	.00	.30	.06
13	4	6	-19.16	.00	.00	.00	-.08	.00
15	16	6	35.55	.01	.00	.00	.15	.01
17	16	14	51.39	.01	.00	.00	.21	.03
19	12	14	-6.39	.00	.00	.00	-.03	.00
21	10	12	38.61	.03	.00	.00	.16	.02
23	8	10	-28.61	-.02	.00	.00	-.12	-.01
25	6	8	16.39	.00	.00	.00	.07	.00
29	30	10	112.22	.04	.00	.00	.32	.05
31	28	30	33.78	.01	.00	.00	.14	.01
33	28	26	-55.78	-.07	.00	.00	-.16	-.01
35	24	26	74.78	.01	.00	.00	.16	.01
37	24	34	-93.78	-.07	.00	.00	-.27	-.04
39	34	22	42.59	.01	.00	.00	.09	.00
41	36	22	48.85	.01	.00	.00	.10	.01
43	22	32	78.44	.11	.00	.00	.22	.03
45	32	30	78.44	.04	.00	.00	.22	.03
47	36	20	105.14	.11	.00	.00	.30	.05
49	20	18	105.14	.06	.00	.00	.30	.05

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
2	38.00	254.82	46.00	90.49
4	93.00	254.78	33.00	96.10
6	.00	254.78	43.00	91.77
8	45.00	254.78	29.00	97.84
10	45.00	254.80	20.00	101.75
12	45.00	254.77	35.00	95.23
14	45.00	254.77	41.00	92.64
16	.00	254.79	41.00	92.64
18	.00	254.83	53.00	87.46
20	.00	254.89	58.00	85.32
22	13.00	254.99	139.00	50.26
24	19.00	254.93	89.00	71.90
26	19.00	254.92	100.00	67.13
28	22.00	254.85	10.00	106.10
30	.00	254.84	15.00	103.93
32	.00	254.88	20.00	101.78
34	.00	255.00		
36	.00	255.00		
	MAXIMUM PRESSURES			
28	22.00	254.85	10.00	106.10
30	.00	254.84	15.00	103.93
32	.00	254.88	20.00	101.78
	MINIMUM PRESSURES			
22	13.00	254.99	139.00	50.26
26	19.00	254.92	100.00	67.13

24	19.00	254.93	89.00	71.90

THE NET SYSTEM DEMAND = 384.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	93.64
3	153.99
5	136.37

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 384.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 1.65

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
8	84.15
10	84.15
12	84.15
14	84.15

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00026

MAXIMUM DAY DEMANDS
PROJECT BUILDOUT

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	2	164.63	.51	.00	.00	.67	.25
3	0	36	271.04	.00	.00	.00	.56	.12
5	0	34	237.53	.00	.00	.00	.50	.10
7	2	18	-28.94	-.01	.00	.00	-.18	-.03
9	18	16	156.41	.12	.00	.00	.64	.23
11	2	4	130.87	.12	.00	.00	.53	.17
13	4	6	-22.58	.00	.00	.00	-.09	-.01
15	16	6	58.21	.02	.00	.00	.24	.04
17	16	14	98.20	.05	.00	.00	.40	.10
19	12	14	-14.05	-.01	.00	.00	-.06	.00
21	10	12	70.10	.08	.00	.00	.29	.05
23	8	10	-48.52	-.05	.00	.00	-.20	-.03
25	6	8	35.63	.01	.00	.00	.15	.01
29	30	10	202.77	.12	.00	.00	.58	.15
31	28	30	63.80	.03	.00	.00	.26	.04
33	28	26	-100.10	-.21	.00	.00	-.28	-.04
35	24	26	131.45	.03	.00	.00	.27	.03
37	24	34	-162.80	-.20	.00	.00	-.46	-.10
39	34	22	74.74	.03	.00	.00	.16	.01
41	36	22	85.69	.03	.00	.00	.18	.01
43	22	32	138.98	.30	.00	.00	.39	.08
45	32	30	138.98	.13	.00	.00	.39	.08
47	36	20	185.35	.31	.00	.00	.53	.13
49	20	18	185.35	.18	.00	.00	.53	.13

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
2	62.70	254.49	46.00	90.35
4	153.45	254.37	33.00	95.93
6	.00	254.37	43.00	91.59
8	84.15	254.36	29.00	97.66
10	84.15	254.41	20.00	101.58
12	84.15	254.34	35.00	95.05
14	84.15	254.34	41.00	92.45
16	.00	254.39	41.00	92.47
18	.00	254.51	53.00	87.32
20	.00	254.69	58.00	85.23
22	21.45	254.97	139.00	50.25
24	31.35	254.80	89.00	71.84
26	31.35	254.77	100.00	67.07
28	36.30	254.56	10.00	105.98
30	.00	254.54	15.00	103.80
32	.00	254.67	20.00	101.69
34	.00	255.00		
36	.00	255.00		
	MAXIMUM PRESSURES			
28	36.30	254.56	10.00	105.98
30	.00	254.54	15.00	103.80
32	.00	254.67	20.00	101.69
	MINIMUM PRESSURES			
22	21.45	254.97	139.00	50.25
26	31.35	254.77	100.00	67.07
24	31.35	254.80	89.00	71.84

THE NET SYSTEM DEMAND = 673.20

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	164.63
3	271.04
5	237.53

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 673.20
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 1.65

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
8	2084.15
10	84.15
12	2084.15
14	2084.15

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00027

MAX DAY DEMANDS PLUS 6000 GPM FIRE FLOW ONSITE
PROJECT BUILDOUT
2000 GPM AT 8 12 14

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	2	1790.10	42.02	.00	.00	7.31	21.01
3	0	36	2874.83	.10	.00	.00	5.99	9.81
5	0	34	2008.27	.05	.00	.00	4.19	5.05
7	2	18	214.54	.49	.00	.00	1.37	1.22
9	18	16	2269.26	16.30	.00	.00	9.27	32.60
11	2	4	1512.86	11.54	.00	.00	6.18	15.39
13	4	6	1359.41	5.05	.00	.00	5.55	12.62
15	16	6	-212.28	-.20	.00	.00	-.87	-.41
17	16	14	2481.53	19.24	.00	.00	10.14	38.47
19	12	14	-397.38	-3.49	.00	.00	-1.62	-1.29
21	10	12	1686.77	28.23	.00	.00	6.89	18.82
23	8	10	-937.02	-12.67	.00	.00	-3.83	-6.34
25	6	8	1147.13	7.37	.00	.00	4.69	9.22
29	30	10	2707.94	14.89	.00	.00	7.68	18.61
31	28	30	1188.02	5.90	.00	.00	4.85	9.83
33	28	26	-1224.32	-21.39	.00	.00	-3.47	-4.28
35	24	26	1255.67	1.69	.00	.00	2.62	2.12
37	24	34	-1287.02	-9.39	.00	.00	-3.65	-4.69
39	34	22	721.25	1.97	.00	.00	1.50	.76
41	36	22	820.11	1.92	.00	.00	1.71	.96
43	22	32	1519.92	25.54	.00	.00	4.31	6.39
45	32	30	1519.92	10.86	.00	.00	4.31	6.39
47	36	20	2054.72	26.79	.00	.00	5.83	11.16
49	20	18	2054.72	15.63	.00	.00	5.83	11.16

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
2	62.70	212.98	46.00	72.36
4	153.45	201.44	33.00	72.99
6	.00	196.39	43.00	66.47
8	2084.15	189.02	29.00	69.34
10	84.15	201.69	20.00	78.73
12	2084.15	173.46	35.00	60.00
14	2084.15	176.95	41.00	58.91
16	.00	196.19	41.00	67.25
18	.00	212.49	53.00	69.11
20	.00	228.11	58.00	73.72
22	21.45	252.98	139.00	49.39
24	31.35	245.56	89.00	67.84
26	31.35	243.87	100.00	62.34
28	36.30	222.48	10.00	92.07
30	.00	216.58	15.00	87.35
32	.00	227.43	20.00	89.89
34	.00	254.95		
36	.00	254.90		

MAXIMUM PRESSURES

28	36.30	222.48	10.00	92.07
32	.00	227.43	20.00	89.89
30	.00	216.58	15.00	87.35

MINIMUM PRESSURES

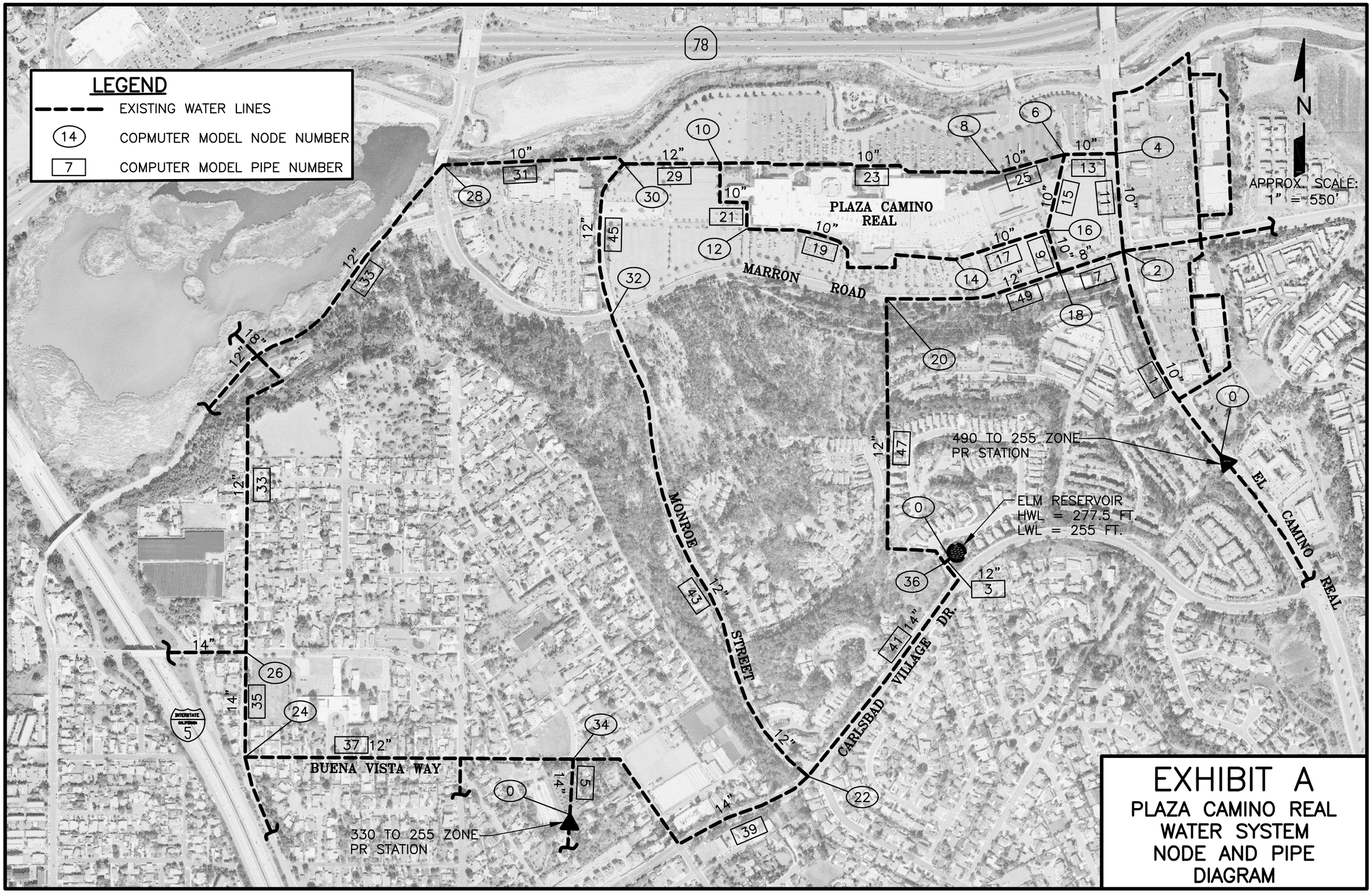
22	21.45	252.98	139.00	49.39
14	2084.15	176.95	41.00	58.91
12	2084.15	173.46	35.00	60.00

THE NET SYSTEM DEMAND = 6673.20

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	1790.10
3	2874.83
5	2008.27

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 6673.20
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00



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